

IN THE CLAIMS

Claim 1 (Previously Presented): A method for forming a flowable dielectric layer in a semiconductor device, the method comprising the steps of:

a) forming a plurality of patterns on a semiconductor substrate, wherein narrow and deep gaps are formed therebetween;

b) forming a flowable dielectric layer to fill the gaps between the patterns wherein step b) is carried out at a temperature in a range of about -10 °C to about 150 °C under a pressure ranging from about 10 mTorr to about 100 Torr, wherein a reaction source uses a mixture gas of $\text{SiH}_x(\text{CH}_3)_y$ ($0 \leq x \leq 4$, $0 \leq y \leq 4$), H_2O_2 , O_2 , H_2O and N_2O ;

c) carrying out an annealing process for densifying the flowable dielectric layer and removing moisture therein;

d) forming a plurality of contact holes by selectively etching the flowable dielectric layer so as to expose predetermined portions of the semiconductor substrate;

e) forming a barrier layer on sidewalls of the contact holes for preventing micro-pores in the flowable dielectric layer;

f) carrying out a cleaning process in order to remove native oxides and defects on the semiconductor substrate; and

g) forming a plurality of contact plugs by filling a conductive material into the contact plugs.

Claim 2 (Original): The method as recited in claim 1, wherein the step e) includes the steps of:

e1) forming an insulating layer over the resultant structure; and

e2) carrying out a dry etching so as to form spacers on the sidewalls of the contact holes.

Claim 3 (Original): The method as recited in claim 2, wherein the step e2) is carried out by using a blanket etch process.

Claim 4 (Original): The method as recited in claim 1, wherein the barrier layer employs a material selected from the group consisting of a silicon oxide, a silicon nitride and a silicon carbide.

Claim 5 (Currently Amended): The method as recited in claim 1, wherein the barrier layer is formed with a thickness in a range of about 20 \AA to about 300 \AA .

Claim 6 (Original): The method as recited in claim 1, after the step d), further comprising the step of carrying out a pre-cleaning process for removing native oxides and the other impurities.

Claim 7 (Previously Presented): The method as recited in claim 1, wherein the step c) is carried out in a furnace at a temperature in a range of about 300 °C to about 1,000 °C.

Claim 8 (Original): The method as recited in claim 1, wherein the step b0 is carried out by using a spin on dielectric (SOD) selected from the group consisting of a silicate, a siloxane, a methyl SilsesQuioxane (MSQ), a hydrogen SilsesQuioxane(HSQ), an MSQ/HSQ, a perhydrosilazane (TCPS) or a polysilazane.

Claim 9 (Canceled)